

Supplemental Material

Personal Exposures to Traffic-Related Air Pollution and Acute Respiratory Health Among Bronx School Children with Asthma

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Descriptive Statistics of Health Outcomes

During the course of the study, five subjects had afternoon PEF values that averaged less than 80% of predicted, while fourteen subjects had afternoon FEV₁ values that averaged less than 80% of predicted. The mean afternoon PEF value across all subjects was 271 (\pm 52) liters/minute, and mean afternoon FEV₁ was 1.78 (\pm .35) liters. In general, morning lung function measures were slightly lower than afternoon measures (see Supplemental Material Table 1), as expected. PEF variability was slightly higher in the mornings than in the afternoons, but this trend is reversed for FEV₁. Cough was the most prevalent symptom of the three symptoms reported, and a median number of seven out of ten children per day exhibited at least one of the three recorded symptoms (Supplemental Material Table 1).

Descriptive Statistics of Personal and School-Site Exposure Measurements

Fifteen personal filter samples were excluded from the analysis because of equipment malfunction, or if the backpack was not with the subject on that day. This indicates that non-compliant samples were less than 15 out of the total samples collected: 621, or less than 2%. Three additional days were excluded from the health analysis due to missing filter data or suspect equipment functioning, and one outlying subject was excluded due to problems with compliance and inconsistent correlations with the school-site monitor. An additional five outlying personal filter observations were excluded from the health analysis from reported cooking, smoking or other suspect behavior noted in the activity diaries. A total of 578 person-days were available from the filter measurements for the health effects analysis.

The overall mean personal EC concentration across all four schools was 1.9 ± 1.4 $\mu\text{g}/\text{m}^3$, and was equivalent to the mean outdoor school-site EC concentration of 1.9 ± 1.1 $\mu\text{g}/\text{m}^3$. The mean personal PM_{2.5} concentration was 24.1 ± 22.4 $\mu\text{g}/\text{m}^3$, and the mean outdoor school-site PM_{2.5} concentration was ten micrograms lower: 14.3 ± 7.4 $\mu\text{g}/\text{m}^3$. EC comprised approximately 7% of total personal PM_{2.5} exposure on a daily basis, while the average daily EC/PM_{2.5} fraction from the outdoor school-site data was approximately 13%. Overall, personal EC was only moderately correlated with total PM_{2.5} mass accumulated on the same filter ($r = 0.43$). In contrast, school-site PM and EC were

highly correlated ($r = 0.83$), suggesting that the poor correlation between personal EC and personal PM was due to indoor PM sources. Personal $PM_{2.5}$ measurements were statistically significantly higher than outdoor school-site measurements ($24.1 \mu\text{g}/\text{m}^3$ versus $14.3 \mu\text{g}/\text{m}^3$ $p < 0.05$, by standard two-sample t-test). Personal EC levels, on the other hand, were generally equivalent or lower than outdoor school-site measurements. More detailed descriptive statistics on daily pollutant levels, and correlations between personal and school-site pollutants, are included in the exposure assessment results of this study reported in Spira-Cohen et al. (2010).

Supplemental Material Table 1: Subject characteristics and descriptive statistics by South Bronx School

Parameter	All Schools	PS154	MS302	CS152	MS2
		April 29 th – May 19 th	May 4 th – May 28 th	Oct 12 th – Nov 4 th	
Sampling Dates		2002	2004	2004	May 3 rd – May 10 th
Distance from a highway		173 ft.	1,216 ft.	128 ft.	2,419 ft.
Subject Characteristics					
Age	11	10.8	10.6	10.0	10.9
No. males/females	22/18	5/5	6/4	4/6	8/2
No. Subjects owning cat/dog	8	4	3	0	1
No. hospitalized or visited ER for asthma in previous 12 months (No./tot) ^a	16/35	5/9	4/10	4/9	3/7
No. with rescue inhaler or nebulizer (No./tot)	31/36	7/9	9/10	7/9	8/8
No. with mean Afternoon PEF < 80% predicted (No./tot)	5/40	1/10	0/10	2/10	2/10
No. with mean Afternoon FEV ₁ < 80% predicted (No./tot)	14/40	2/10	5/10	2/10	5/10
Mean PEF morning(SD)/afternoon(SD) ^b	259(54)/271(49)	277(54)/289(55)	251(46)/260(37)	238(58)/261(54)	269(54)/271(49)
Mean FEV1 morning(SD)/afternoon(SD) ^b	1.73(0.37)/1.78(0.33)	1.84(0.43)/1.86(0.43)	1.63(0.38)/1.64(0.33)	1.70(0.34)/1.8(0.30)	1.79(0.28)/1.8(0.30)
Daily Symptom score (median no. subjects with positive symptom score by day) ^c					
Cough (min,max)	6 (0,10)	5 (0,8)	7 (5,10)	7 (0,9)	4 (0,10)
Wheeze (min,max)	3 (0,6)	2 (0,5)	4 (3,6)	3 (0,5)	1 (0,10)
Shortness of Breath (min,max)	3 (0,8)	4 (0,8)	3 (1,4)	5 (0,8)	0 (0,10)
Total Symptoms (min,max)	7 (0,10) ^c	7 (0,9)	8 (6,10)	8 (0,9)	5 (0,10)

^a Data missing for 5 subjects.

^b The afternoon maneuver closest to 3pm (of afternoon measurements from 12-6pm) was used for the analysis. If more than one measurement was taken within an hour of 3pm (from 2-4pm) an average of the values was computed.

^c For example, a given day during the study had a median of seven out of the ten subjects having a positive symptom score, with a minimum of 0 subjects and a maximum of ten subjects exhibiting symptoms.